

U.S. GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

FOR RELEASE ON DELIVERY
Expected at 9:30 AM
Wednesday, July 15, 1981

STATEMENT OF

MORTON A. MYERS
DIRECTOR
PROGRAM ANALYSIS DIVISION



115776

BEFORE THE
SUBCOMMITTEE ON INNOVATION AND TECHNOLOGY
COMMITTEE ON SMALL BUSINESS
UNITED STATES SENATE

ON

GAO REPORT ENTITLED
"CONSISTENT CRITERIA ARE NEEDED TO ASSESS
SMALL-BUSINESS INNOVATION INITIATIVES"

AND

S. 881 -- THE SMALL BUSINESS RESEARCH ACT OF 1981

Mr. Chairman and Members of the Committee:

We are pleased to be here today to discuss GAO's report on small businesses and innovation and to comment on S. 881-- the Small Business Research Act of 1981. This bill would create individual, agency-sponsored, small-business innovation research programs (SBIR's) to foster innovation by small businesses. Our study of small-business innovation addresses the conditions that we found to be necessary for small-business innovation to flourish.

[Comments on S. 881 and GAO Report on Small-Business Innovation Initiatives]

115776
017567

SMALL BUSINESSES AND INNOVATION

It is clear from our analysis that small businesses are important contributors to the innovation process in this country. Our objective has been to construct a comprehensive picture of small-business innovation. To do this, we focused on three questions:

- What factors influence the environment within which small businesses innovate?
- How do small businesses act as innovators within that environment? and
- How can an understanding of the answers to these two questions contribute to Federal policymaking efforts to support small-business innovation?

The digest of our report, which provides more detail on the scope of our work, is appended to my statement.

Factors in the environment

The extent to which a small firm is likely to innovate is determined by three sets of factors:

- broad economy-wide factors, such as tax policy,
- factors specific to individual industries, such as the rate of growth of the industry, and
- the characteristics of individual firms, including the entrepreneurial nature of key individuals within it.

For a small firm to be active and successful in innovation, a number of factors have a significant influence.

- One is technological opportunity--by which we mean the extent to which technological or scientific know-how can be put to use and exploited by a firm.
- A second factor is the presence of an entrepreneur or inventor, who, generally spurred by the profit motive, exploits that technological opportunity.

--The firm must also be capable of producing the innovation at a cost that makes it competitive with substitute goods and, of course, the firm must be able to compete successfully with other firms in its industry.

--Finally, if a small firm is to reap the benefits of innovation, it must be able to introduce the result of its innovative activities into commercial or Government use.

Activities of small businesses

The innovative activities of small businesses vary depending on the structure of the industry in which they are operating. In an industry or sector of an industry in which most of the firms are small, small businesses are likely to be responsible for the majority of all innovation. In concentrated industries in which most of the firms would be considered large, small businesses are likely to perform specialized innovative functions and develop products or processes to be used or marketed by other--usually larger--firms in that industry.

Conditions conducive to innovation by small businesses

Understanding, then, the factors that influence small-business innovation and the activities of small businesses as innovators, we have isolated the conditions that are most likely to foster innovation by small businesses. Actually, there are three sets of conditions: those that are necessary for small-business innovation to occur, those that are important but not as necessary, and those that are desirable but not as important.

Briefly, for a Federal initiative to help to meet these necessary conditions, it should

- encourage the exploitation of technological opportunity,
- ensure the managerial and technical capacity of firms undertaking innovation,

- ensure the adequacy of financial and human resources throughout the innovation process, and
- promote innovation in technologies and industries in which small businesses can be expected to assemble requisite resources.

Federal initiatives that are to address the conditions that are important but not necessary to foster small-business innovation should

- stimulate the creation and augmentation of technological opportunity and
- increase the availability of financial and human resources.

And, finally, if a Federal initiative is to help meet the conditions that are desirable but not as important in fostering small businesses in innovation, it should

- address enough individual incentives and barriers to influence the balance between them positively.

THE SMALL BUSINESS RESEARCH ACT OF 1981

The Small Business Research Act of 1981 would allow for the creation of small-business innovation research programs in agencies with research or research and development budgets in excess of \$100 million and would establish goal-setting requirements for funding agreements for research or research and development to small businesses in agencies with R&D budgets in excess of \$20 million. The framework that the Act provides is sufficiently flexible to allow agencies to design small-business innovation research programs that could contain a number of the conditions that we have outlined. We are concerned, however, that the bill as written lacks targeting and flexibility in the way it is to be funded. We would prefer that a funding mechanism different from the one proposed be used.

Exploitation, augmentation, and creation of technological opportunity

One condition necessary to foster small-business innovation is the encouragement of the exploitation of technological opportunity. S. 881 would allow the design of innovation research programs to do this. It would also permit program design to stimulate the creation of technological opportunity or to augment existing technological opportunity--an important condition in fostering small-business innovation.

These conditions could be addressed by means of the process used to solicit research proposals. Agencies soliciting research could address these conditions by requesting that proposals identify technological solutions in problem areas the agencies specify. Applying existing methods or technologies in solving new problems is the exploitation of technological opportunity. Firms responding to such a solicitation might also be stimulated to augment existing technology or to create new technologies.

Managerial and technical capacity of small businesses

Another necessary condition is that firms undertaking innovation must have adequate managerial and technical capacity. Although we recognize that it is difficult to develop criteria that would identify or predict such capacity, the bill's acquisition process would at least provide the opportunity to obtain information on a firm's technical and organizational capabilities.

Financial and human resources

The framework of S. 881 would also allow SBIR program design to ensure financial and human resources adequate to support innovation. It would do this in two ways. First, SBIR programs

would provide successful applicants with specific financial support, thus meeting this condition quite directly. Second, the bill would allow program design to address this condition indirectly through "phased support."

The phases of support that are outlined in the bill coincide with the three stages of the innovation process as we have defined it--invention, development, and commercialization. Under the bill, the first phase of support would provide funds to investigate an idea's technical feasibility. The second phase would provide funds to develop and explore the concepts identified in phase one as technically feasible. The third phase, moving the invention into commercialization, would either encourage third-party follow-on funding to commercialize the results of the innovative activities or would provide for contracts to produce the innovation for the government. In either case, circumstances would have provided the firm with support for the last stage of the innovation process--the use of the innovation. Until an innovation has been put to use--whether in the private or the public sector--the economic benefits of innovation do not accrue to individuals or to society.

Funding approaches for SBIR programs

To fund the SBIR programs, S. 881 would require eligible Federal agencies to allocate a minimum percentage of research or research and development funds for expenditure under a small-business innovation research program. In our opinion, it would be better if the funding were more targeted and more flexible than proposed in the bill. One way to accomplish this flexibility

would be to authorize SBIRs for each agency with large research and development programs, with funding levels set through the normal budget process. This flexibility would allow funding for some SBIR programs to be set at higher or lower levels, depending on individual agency circumstances.

I would be happy to answer any questions you may have at this time.

D I G E S T

Today's concern about the ability of small businesses to innovate is prompted by a larger concern about a perceived decline in U.S. industrial innovation and the belief that small businesses are vital to innovation in this country. The small-business community has voiced concern that the ability of small businesses to be active in innovation is inhibited by a number of Federal policies. The Congress has responded actively with legislation that addresses both the question of declining industrial innovation and the issue of the ability of small businesses to be innovative.

In this report, GAO provides a comprehensive picture of small-business innovation by showing what influences the environment within which small manufacturing businesses innovate and how these small businesses act as innovators in that environment. The objective of this report is to answer three questions:

- What influences the environment within which small businesses innovate?
- How do small businesses act as innovators in that environment?
- How can our understanding of the answers to these two questions contribute to Federal policymaking efforts to support small businesses as innovators?

In addressing these questions, GAO focuses on innovation in small businesses in the manufacturing sector.

GAO did not examine the activities of university or government laboratories, large or medium-sized businesses, or other institutions engaged in innovative activities. GAO also did not determine whether small businesses are more important to innovation than other innovators or attempt to quantify the innovation deriving from small businesses. GAO did not examine whether small businesses are inhibited by specific Federal policies in their efforts to

innovate or whether the Federal Government should support small-business innovation in preference to supporting other potential innovators.

THE FACTORS THAT INFLUENCE SMALL-BUSINESS INNOVATION

The climate for innovation within a firm is a combination of the characteristics of that particular firm, including the capabilities and entrepreneurial nature of key individuals within it, the industry in which it operates, and the broader economy-wide climate affecting both the industry and the firm. (pp. 12-21) The activities of small businesses as innovators are largely determined by their industry structure and other industry-specific variables. Small businesses are most likely to be primary contributors in an industry or a sector of an industry in which most firms are small. They are likely to be complementary contributors in more concentrated industries, where they tend to perform specialized innovative functions and develop products or processes used by other, usually larger, firms in that industry. (pp. 24-27)

While a number of factors influence the climate within which small businesses innovate, only some can be manipulated by Government policy. Among economy-wide factors, only incentives and barriers are readily amenable to policy influence. Industry-specific factors that public policy can affect are the availability of resources, technological opportunity, and the balance between supply and demand. Within individual firms, the availability of resources and technological opportunity are most amenable to Government policy influence. (pp. 31-32)

CRITERIA FOR ASSESSING FEDERAL INITIATIVES TO SUPPORT SMALL-BUSINESS INNOVATION

Analyzing the factors that influence innovation allowed GAO to isolate the conditions that are necessary, the conditions that are important, and the conditions that are desirable if small-business innovation is to flourish. Based on these conditions, GAO developed criteria for judging the efficacy of Federal initiatives intended to foster small-business innovation. (pp. 32-33)

To satisfy the criteria for conditions necessary in fostering small-business innovation, Federal initiatives should

- encourage exploitation of technological opportunity,
- ensure managerial and technical capacity of individual firms,
- ensure adequacy of financial and human resources throughout the innovation process, and
- promote innovation in technologies or industries in which small businesses can assemble requisite resources.

To satisfy the criteria for conditions important in fostering small-business innovation, Federal initiatives should

- stimulate creation and augmentation of technological opportunity and
- increase availability of financial and human resources.

To satisfy the criteria for conditions desirable for fostering small-business innovation, Federal initiatives should

- address enough incentives and barriers to influence the balance between them positively.

GAO demonstrates the usefulness of these criteria by considering the design of several existing Federal efforts to support the activities of small businesses as innovators. Use of the criteria with Federal efforts to influence economy-wide factors (such as tax and patent policies) indicates that such efforts might be expected to affect the economy-wide climate for innovation positively. A positive economy-wide climate is desirable but does not meet the necessary criteria for conditions supporting small-business innovation. (pp. 35-36)

Use of the criteria with Federal programs designed to provide funding or technical and management assistance directly to small businesses (such as the National Science Foundation's Small Business Innovation Research

program) indicates that such programs would be likely to meet the necessary criteria for conditions supporting the activities of small businesses as innovators. (pp. 36-40)

CONCLUSIONS

Having analyzed the factors that influence the environment for innovation, the activities of small businesses within that environment, and the conditions that support small businesses as innovators, GAO concludes that small businesses act differently as innovators depending on the characteristics of the industry of which they are a part. How likely it is that small businesses will innovate is influenced by a complex set of economy-wide, industry-specific, and individual-firm factors. Only some of the factors that influence the environment for innovation are readily amenable to Federal policy influence. The environment for innovation is common for all potential innovators. Actions intended to affect one category of innovator will also affect others, although the effects may be quite different. (pp. 45-46)

Finally, GAO presents several specific questions for research that would usefully augment the information in this report. (pp. 46-47)

AGENCY COMMENTS

The National Science Foundation (NSF), the Small Business Administration (SBA), and the Department of Commerce (DOC) commented on a draft of this report, and all three agreed that the report makes an important contribution to what is known about small businesses and innovation. DOC stated that GAO's approach is "systematic, unbiased, and more comprehensive than existing studies." (p. 81)

NSF and SBA commented that the report should more specifically reflect the importance of the entrepreneurial role and the profit motive. While GAO agrees that these are important influences, GAO has taken them to be implicit elements of the conditions that are conducive to innovation and therefore does not discuss them explicitly. (pp. 47-49)

Also, SBA asked GAO to remove its reference to the SBA-funded innovation centers because they are experimental and have not yet been evalu-

ated. GAO appreciates SBA's concern that neither positive nor negative comments be made about these centers until they have been evaluated. It was GAO's purpose not to evaluate these programs, however, but simply to illustrate the usefulness of the criteria GAO developed for judging the efficacy of Federal initiatives. This point is made explicitly where appropriate in the report, and the references remain. (p. 49)

DOC was concerned that models GAO presents in chapter 2 "raise more questions than they help to answer" and that GAO might have used case studies instead of models to view the complex relationships they depict. (p. 82) GAO agrees that case studies would amplify the models, but the models are presented as hypotheses, and questions are therefore to be expected.

RECOMMENDATION TO THE CONGRESS

The Congress has responded actively to the perceived decline in innovation in this country by making numerous efforts to stimulate innovation in general and to support the activities of small businesses in particular. GAO recommends that in its deliberations on bills currently pending and on future initiatives to support small-business innovation, the Congress use the criteria presented in this report to assess the degree to which proposed initiatives are likely to enhance the conditions that foster innovation by small businesses.